

A new species of crayfish (Crustacea: Decapoda: Cambaridae) from Lake Catemaco, Veracruz, Mexico

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Abstract.—*Procambarus (Austrocambarus) catemacoensis*, a new species of crayfish, is described from Lake Catemaco, Veracruz, Mexico. The new species is morphologically similar to *P. (A.) acanthophorus* Villalobos, 1948, from which it can be distinguished by having two or three spines on the anterior border of the carapace, an obliterated areola, smaller and separated spines in the cervical groove, second segment of the antennal peduncle with a spine, gonopod of form I male with bladelike mesial process curved over the lateral border, and annulus ventralis trapezoidal.

Procambarus (Austrocambarus) acanthophorus Villalobos, 1948, was described from "El Castillo", a locality 4 km west of Tuxtepec, Oaxaca, and having a distribution that included four sites in the neighboring regions of Veracruz. Villalobos (1954), in his review of some species in the *mexicanus* Group, also recorded *P. (A.) acanthophorus* from Espagoya, a marsh area in the northeast section of Lake Catemaco, Veracruz. The range of *P. (A.) acanthophorus* was later modified by Villalobos (1955), extending it to the environs of the Port of Veracruz, and subsequently by Hobbs (1989), who recorded it from Chiapas. A recent detailed examination of these collections revealed that the specimens from Espagoya represented a new species (Rojas 1998), which is described herein.

All specimens cited are deposited in the Colección Nacional de Crustáceos, Instituto de Biología, Universidad Nacional Autónoma de México (CNCR). Other abbreviations used are: coll., collector; RL, rostrum length; TCL, total carapace length.

Procambarus (Austrocambarus) catemacoensis, new species
Figs. 1-2

Procambarus (Austrocambarus) acanthophorus.—Villalobos, 1954:364; 1955:224; 1983:213.

Diagnosis.—Body pigmented, eyes normally developed. Rostrum with reduced marginal spines, median carina absent. Acumen length 21.1% to 30% of RL (\bar{X} = 24.5%). Carapace with 2 pairs of short cervical spines, both oriented cephaloventrally (Fig. 1a). Areola obliterated, 30.6% to 34.9% (\bar{X} = 32.7%) of TCL (Fig. 1b). Anterior margin of carapace straight, with weak suborbital angle, and 2 to 3 spines of unequal size in addition to branchiostegal spine. Postorbital ridges well marked, cephalic margin with short spine. Antennal scale 2.3 times as long as wide, maximum width at midlength, lateral margin thickened and terminating in spine. Second segment of endopodite of antennal peduncle with spine on distal margin (Fig. 2b). Chelipeds subequal in length, shorter than TCL, covered with squamous tubercles, pubes-

cent; fingers shorter than inner margin of palm, which about twice as long as broad; dactyl with fine, long setae along dorsal surface, opposable margin with prominent tubercle near midlength, finely serrate distally; fixed finger with short setae along ventral margin, opposable margin with 2 or 3 proximal tubercles, finely serrate distally (Figs. 1c–d). Ischium of third pereopod of form I male armed with acute hook, tip of which reaching beyond articulation with basipodite (Fig. 1f). First pair of pleopods (gonopods) of form I male short, symmetrical, devoid of subterminal setae; shoulder on cephalic surface at base of terminal elements wide and strong, distally with 2 borders separated by deep v-shaped depression (Fig. 2c); laterodistal border wide, rounded, lower than mesiodistal border (Fig. 2e); mesiodistal border narrow, inclined, divided by deep notch next to base of cephalic process. In caudal view, lateral border prominent, distal portion rounded, with wide and shallow notch (visible in cephalic view); in lateral view, lateral border extending to midlength of mesial process; in cephalic view, surface of border covered with rounded tubercles and with submarginal groove. Mesial process short, wide, lightly sclerotized, curved laterally, adjacent to lateral shoulder, flattened mesio-laterally, ending in angular tip. Cephalic process small, subtriangular, joining with each vertex central projection, mesial process, and mesiodistal border on cephalic shoulder. Central projection triangular in cephalic view, formed by caudal and cephalic elements. Preannular plate of annulus ventralis complete, extending laterally beyond sternal plates, reaching coxae of fourth pair of pereopods, 4.5 to 5.2 times as wide as long; anterior margin overlapping adjacent sternal plate, posterior margin with wide median concavity, where median lobe fits. Annulus trapezoidal, anterior margin projected cephalically, with deep cephalic groove; apical portion flat, with sigmoidal groove that continues over caudal surface; apical protuberance absent.

Postannular sclerite subtriangular, with apical notch, in contact with annulus (Fig. 2g).

Measurements of types.—See Table 1.

Description of holotypic male, form I.—Body pigmented. Cephalothorax cylindrical, becoming thicker in branchial region, 0.9 times length of abdomen. Areola obliterated, 34.5% of TCL. Dorsal surface of carapace with scattered punctations in gastric region, area next to postorbital ridges with fine punctations; branchial region with punctations of variable size; hepatic region smooth, with few scattered punctations. Anterior border of carapace, between suborbital angle and branchiostegal spine, with 3 spines of unequal size, mesial one largest. Rostrum with reduced marginal spines, dorsal surface smooth, slightly concave; margins of rostrum converging anteriorly, anterior width 2.7 mm, posterior width 5.4 mm; subrostral ridges not visible in dorsal view (Fig. 1b). Acumen length 23.6% of RL, triangular, grooved, tip chitinized, reaching distal margin of ultimate podomere of antennular peduncle. Postorbital ridges parallel, well marked, ending in short cephalic spine. Suborbital margin of carapace straight, infraorbital spine absent. Two short cervical spines each side of carapace, oriented cephaloventrally (Fig. 1a); cervical groove discontinuous.

Abdomen narrower than carapace, tergal region of somites with scarce punctations, pleural surface smooth. Telson covered with short setae dorsally; cephalic portion with 2 spines of equal length in posterolateral angles, external one fixed, internal one articulated; caudal margin of telson straight. Cephalic lobe of epistome subtriangular, anterior vertex with acute cephalomedian projection, caudolateral angles broadly rounded, ventral surface flat with scattered small setae; cephalic lobe delimited posteriorly by strong constriction; body of epistome with raised lateral margins, fovea in cephalomedian section, well defined (Fig. 1e). Antennal scale 2.3 times as long as wide, elongated, slender, with deep longitudinal groove; maximum width at mid-

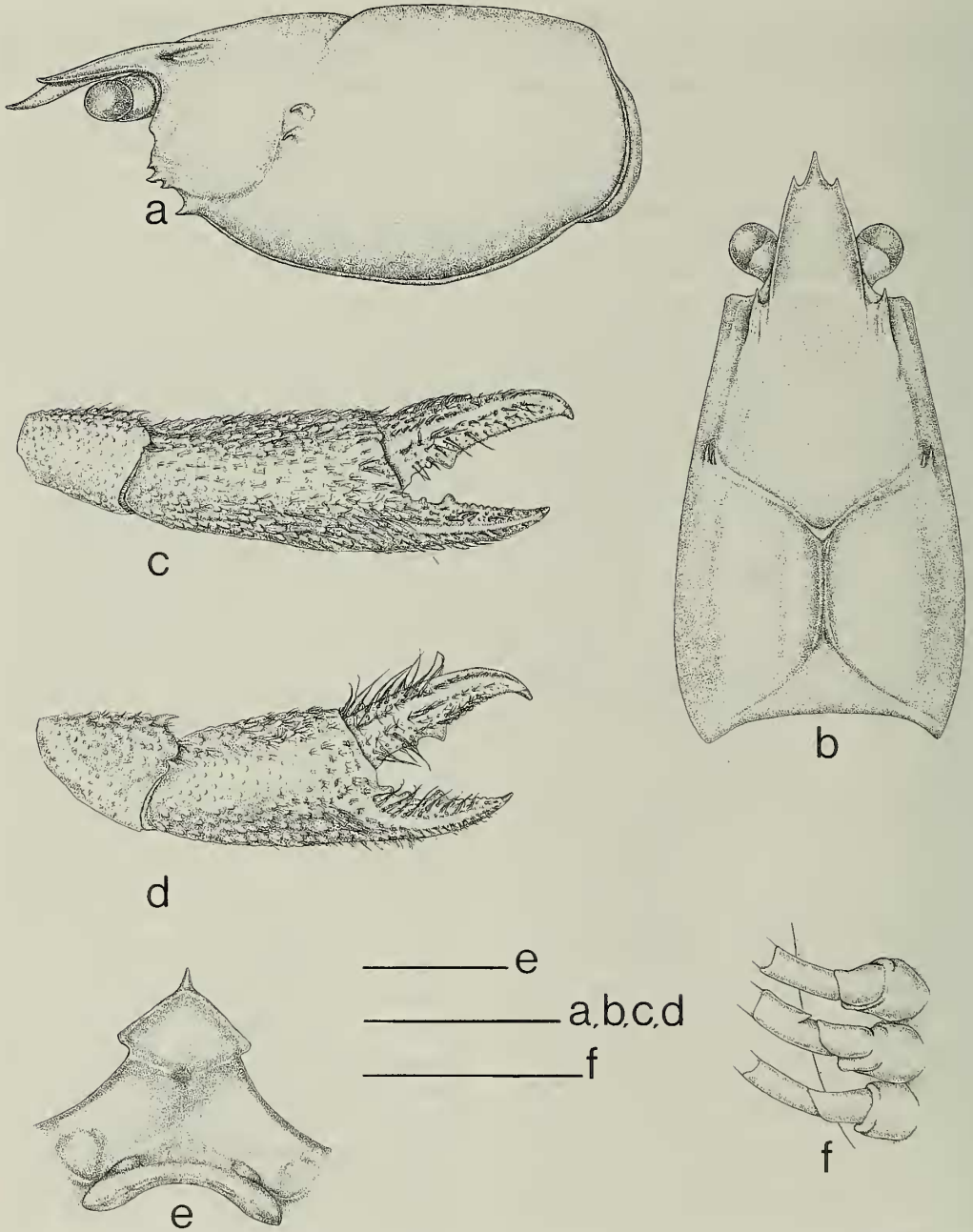


Fig. 1. *Procambarus (Austrocambarus) catemacoensis*, new species, all from holotypic male (CNCR 17993) except d from allotypic female (CNCR 17994): a, carapace, lateral view; b, carapace, dorsal view; c, distal podomeres of right cheliped (male); d, distal podomeres of cheliped (female); e, epistome; f, basal podomeres of left second, third, and fourth pereopods. Scale bars represent 10 mm (a, b, c, d), 2 mm (e), and 5 mm (f).



Fig. 2. *Procambarus (Austrocambarus) catemacoensis*, new species, all from holotypic male (CNCR 17993) except g from allotypic female (CNCR 17994): a, antennal scale, dorsal view; b, proximal two segments of antennal peduncle, ventral view; c, left gonopod, cephalic view; d, left gonopod, caudal view; e, left gonopod, lateral view; f, left gonopod, mesial view; g, annulus ventralis, ventral view.

Table 1.—Measurements (mm) of the type specimens of *Procambarus (Austrocambarus) catemacoensis*, new species.

	Holotypic male, form I	Allotypic female
Total length	62.3	64.0
Carapace		
Total length	31.0	32.0
Postorbital length	22.3	23.7
Areola		
Length	10.7	11.0
Width		0.2
Rostrum		
Length	7.2	9.6
Anterior width	2.7	3.7
Posterior width	5.4	6.7
Acumen length	1.7	2.2
Cheliped		
Length of mesial margin of palm	12.7	10.5
Width of palm	6.6	6.5
Length of lateral margin	21.3	18.7
Length of dactyl	10.1	10.2
Abdomen		
Width	10.3	12.0
Length	31.3	33.0

length (Fig. 2a). Antennal peduncle with basis ending in distolateral spine, ischium with ventral spine. Second segment of endopodite of antennal peduncle with spine on distal margin (Fig. 2b). Third maxilliped reaching midlength of second segment of antennal peduncle; ventral surface of ischium with short, fine setae; exopodite extending beyond distal of merus of endopodite.

Chelae shorter than TCL, tuberculate; right chela 3.2 times as long as broad, pubescent, fingers shorter than palm; palm about 1.9 times as long as broad, lateral surface covered with subsquamous tubercles and long, fine setae along dorsal and ventral margins; mesial surface with scattered setae. Fixed finger with cutting edge flanked laterally by longitudinal row of rounded tubercles.

Carpus approximately conical, dorsal and lateral surfaces with scattered small subsquamous tubercles; dorsal surface bearing

distal, sharp, hooklike spine; mesial surface covered with conical tubercles and long setae (Fig. 1c). Merus with spine on distal margin of dorsal surface; mesially, distal margin with row of small tubercles; lateral surface with scattered punctations; mesial surface with 2 longitudinal, parallel rows of spiniform tubercles, setae on space between rows.

Third pereopods with ischium bearing sharp hook, tip not reaching basioischial articulation (Fig. 1f). Fifth pereopods with coxa bearing small tuberculiform projection on mesial surface.

First pair of pleopods (gonopods) as in Diagnosis.

Uropods with short spines on proximal lobes; mesial ramus with premarginal distomedial spine; lateral ramus with 2 spines on distolateral angle, external one fixed, internal one largest, articulated.

Description of morphotypic male, form II.—Unknown.

Description of allotypic female.—Differing from holotypic male in following characters: Areola linear, 34.4% of TCL; anterior border of carapace, between branchiostegal spine and antennal angle, with 3 spines in addition to branchiostegal spine; right chela shorter, 2.9 times as long as wide; fingers as long as palm, covered with long setae; palm 1.6 times as long as wide, devoid of setae on central portion (Fig. 1d); thoracic sternite ridgelike between first and second pereopods, with 3 subacute tubercles, becoming wider between second and third pereopods, smooth between third and fourth pereopods. Annulus ventralis as described in Diagnosis.

Type locality.—Espagoya, Lake Catemaco (altitude 335 m), Municipio de Catemaco, Veracruz, Mexico (18°27'N, 95°6'W).

Disposition of types.—Holotypic male form I CNCR 17993, allotypic female CNCR 17994. Paratypic males form I (2) CNCR 1414.

Material examined.—All specimens from Espagoya, Lake Catemaco, 335 m of

altitude, Veracruz, México: 1 ♂ juv., 3 ♀ juv. (CNCR 1416), 21 Sep 1953, coll. A. Villalobos; 2 ♀, 3 ♂ juv. (CNCR 1413), 8 Dec 1953, coll. A. Villalobos; 3 ♂ form I, 3 ♀ (CNCR 1414), 17 Apr 1957, coll. A. Villalobos.

Etymology.—The species name is derived from “Catemaco” the name of the lake where the type locality is located.

Remarks.—Although the new species *P. (A.) catemacoensis* is morphologically similar to *P. (A.) acanthophorus*, the two can be distinguished by: a wider mesial process of the form I male gonopod, that is completely folded over the lateral shoulder; in lateral view, laterodistal border of cephalic shoulder closer to apex (half the distance found in *P. (A.) acanthophorus*), mesial process and central projection separated; annulus ventralis trapezoidal, with characteristic groove in apical position (caudally positioned in *P. (A.) acanthophorus*); post-annular sclerite subtriangular with apical notch, in contact with annulus (postannular sclerite oval shaped, smooth, and separated from annulus in *P. (A.) acanthophorus*). In addition the following somatic characters can also be used to discriminate between the two species: the number of spines on the anterior border of the carapace, four in *P. (A.) acanthophorus*, two or three in the new species; an obliterated areola in the new species versus a narrow, but not obliterated one in *P. (A.) acanthophorus*; smaller and separated cervical spines in *P. (A.) catemacoensis*; second segment of the antennal peduncle with a spine in the new species. In adult specimens the chelae of both species differ widely, the males of *P. (A.) catemacoensis* have scattered setae along the dorsal and ventral margins, while in *P. (A.) acanthophorus* the whole chela is densely covered with setae. In the females, the chelae of *P. (A.) catemacoensis* are stronger, and possess a large triangular tooth in the middle portion of the cutting edge of both fingers; while in *P. (A.) acanthophorus* the chelae are slender, elongated, and without the large triangular tooth.

Similar to the problem encountered with *Procambarus (Austrocambarus) mexicanus* (Erichson, 1846), where a number of closely related forms classified as the same taxon have proven to be more than one species (Rojas et al. 1999), the new species described herein was previously confounded with *P. (A.) acanthophorus*. New revisions of widely distributed species of cambarids in Mexico will probably result in the discovery of additional new species.

The Los Tuxtlas region supports a remarkably large list of 12 endemic freshwater decapods (Alvarez & Villalobos 1997, Villalobos & Alvarez 1999). In particular, two cambarids, *P. (A.) vazquezae* Villalobos, 1954 and *P. (A.) catemacoensis* new species, one palaemonid shrimp, and two species of pseudothelphusid crabs, are endemic to Lake Catemaco (Alvarez & Villalobos 1997). As more studies are published increasing the number of endemic freshwater species living in Los Tuxtlas, it becomes evident that stronger protection policies need to be developed for this region.

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